

## Five new species of *Leptus* Latreille, 1796 (Acari: Prostigmata, Erythraeidae) from Asia and Africa

Ryszard Haitlinger

**Abstract.** Five new species of *Leptus* are described: *L. auliacus* from undetermined Tenebrionidae (Coleoptera), Kazakhstan, *L. admeti* from *Airathous ferialis* (Homoptera, Fulgoridae), Sumatra, *L. alkmenae* from *Cassida syratica* (Coleoptera: Chrysomelidae), India, *L. batoricus* from *Pimelia cephalotes* (Tenebrionidae), Mongolia and *L. hammameticus* from undetermined Tenebrionidae, Tunisia. New hosts and localities are given for *L. meloidarum*, *L. mariae* and *L. anomalus*. A key for larvae of the group species having over four intercoxalae is provided.

**Key words.** Acari, Erythraeidae, *Leptus*, Kazakhstan, India, Sumatra, Mongolia, Tunisia, Kirghizstan, Italy.

### Introduction

The genus *Leptus* Latreille, 1796 has a cosmopolitan distribution. In Asia this genus is represented by 19 species described from larval stage. In this paper further four new species from Kazakhstan, Sumatra (Indonesia), India and Mongolia are described. Until now from Southeast Asia 8 species were known based on larvae: *L. gagrellae* (Oud.), *L. terebrans* Vitz., *L. managarus* Haitlinger from Java and Sumatra, *L. tetrigius* South. from Sri Lanka (Ceylon), *L. phuketicus* South. from Thailand, *L. calidus* Shiba, *L. cameronensis* Shiba, and *L. hozumii* Shiba from Malaysia; from Central Asia and West Asia three species were known: *L. guus* Haitlinger from Turkmenia, *L. horiacus* Haitlinger and *L. tammuzi* Haitlinger from Syria, Israel and Saudi Arabia (Oudemans 1912, Vitzthum 1926, Ishii 1933, Kato & Kitahara 1958, Kawashima 1958, Shiba 1976, Southcott 1988, 1994, Haitlinger 1990b, 1994). The new species are associated with Chrysomelidae and Tenebrionidae (Coleoptera) and Fulgoridae (Homoptera).

In Africa the genus *Leptus* is represented hitherto by 25 species; among them only one species *L. mogadoranus* Haitlinger is known from North Africa (Oudemans 1912, Haitlinger 1987b, 1990a, c, 1993). Here I describe a second species, *L. hammameticus* n. sp., from Tunisia, associated with various Tenebrionidae.

In addition, *L. meloidarum* Beron has been found in Kirghizstan and Italy. This species was known hitherto only from Bulgaria (Beron 1975). Also new hosts and localities are given for *L. anomalus* South. in Australia and *L. mariae* Haitlinger in Italy.

### Material and methods

The examined specimens of *Leptus auliacus* n. sp., *L. alkmenae* n. sp., *L. admeti* n. sp. and *L. batoricus* n. sp. were obtained from the collection of Chrysomelidae, Tenebrionidae (Coleoptera) and Fulgoridae (Homoptera) in the Museum of Natural History, Wrocław University (MNHU). The specimens of *L. hammameticus* n. sp., *L. meloidarum* and

*L. mariae* from Italy were obtained by the author from plants and various undetermined insects, mainly belonging to Tenebrionidae and Orthoptera and also from Opiliones. Voucher specimens of the new species are deposited in MNHWU.

Measurements are expressed in micrometers ( $\mu\text{m}$ ). For the terminology of setae and other morphological characters used, see Southcott (1992).

## Descriptions

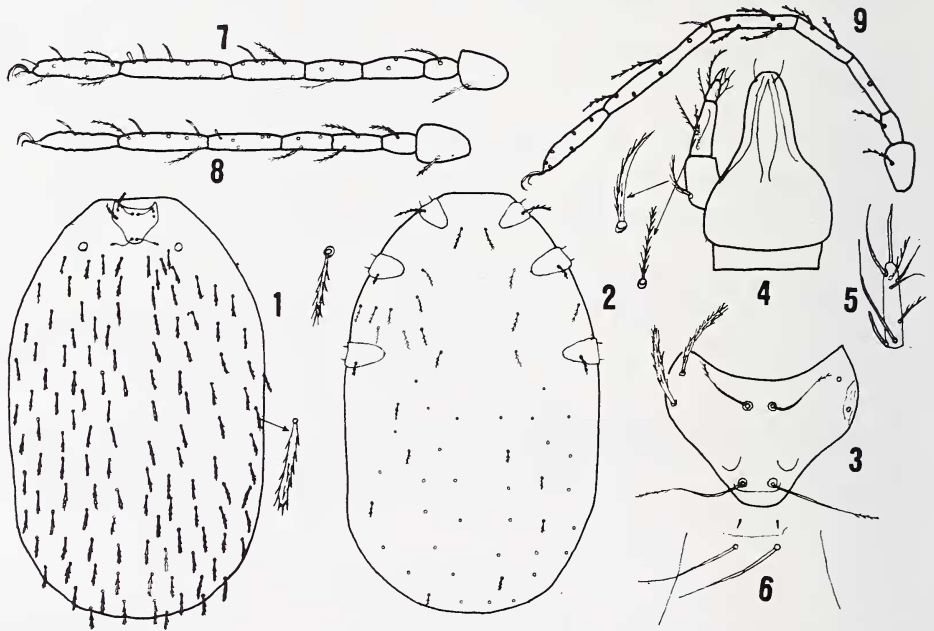
### *Leptus auliacus*, new species

**Diagnosis:** Two palpgenualae,  $\sim 10$  intercoxalae. Scutum wider than long,  $\text{AW} > 110$ ,  $\text{PW} > 120$  nm. AL somewhat longer than PL,  $\text{AL} > 50 \mu\text{m}$ ,  $\text{Ti I} < 200$ ,  $\text{Ta I} < 170$ . Dorsal idiosomalae 32–42 long. GL (length of gnathosoma)  $> 280$ ;  $\text{AW/ISD} > 2.00$ .

**Description:** Dorsal scutum with anterior border deeply convave, posterolateral borders moderately concave. Anterolateral angles acute. Scutalae AL somewhat longer than scutalae PL, all with many setules. Anterior sensillae sockets somewhat above level of posterolateral scutalae bases. Sensillary setae filiform, with setules on distal half (Fig. 3). Diameter of eye lens 18–20. Dorsum of idiosoma with  $\sim 120$  setae rather short, similar to scutalae (Fig. 1).

**Ventral:** surface of idiosoma with sternalae I somewhat longer than sternalae II, all pointed, with long setules. Ten intercoxalae similar to sternalae placed between coxae I–II. Coxalae I about twice longer than coxalae II; coxalae III only somewhat longer than the last setae (Fig. 2).

**Leg lengths** (with coxae, without claws): I 794 (holotype), 806 (paratype); II 712, 682; III 888, 844. Leg specialised setae as follows: SoGe I 57d (32 long), SoTi I 61d (30), SoTi I 80d (26), SoTi II 9d (28), SoTi II 80d (–), SoTi III 4d (30) (Figs 7–9).



Figs 1–9: *Leptus auliacus* n. sp.; 1 — idiosoma, dorsal view; 2 — idiosoma, ventral view; 3 — scutum; 4 — gnathosoma, dorsal view; 5 — palptarsus; 6 — hypostomalae; 7 — leg I, tarsus-coxa; 8 — leg II, tarsus-coxa; 9 — leg III, tarsus-coxa.

Gnathosoma (GL — measured between basis capituli and tip of hypostomal lip) long with long nude hypostomalae (pHy) and very short anterior hypostomalae (aHy) (Fig. 6). Palpfemorala equal in length with dorsal palpgenuala; ventral palpgenuala is somewhat shorter (Fig. 4). Palptarsus with 8 setae; among them two setae barbed (Fig. 5). Palpal setal formula: 0,1,2,3,8.

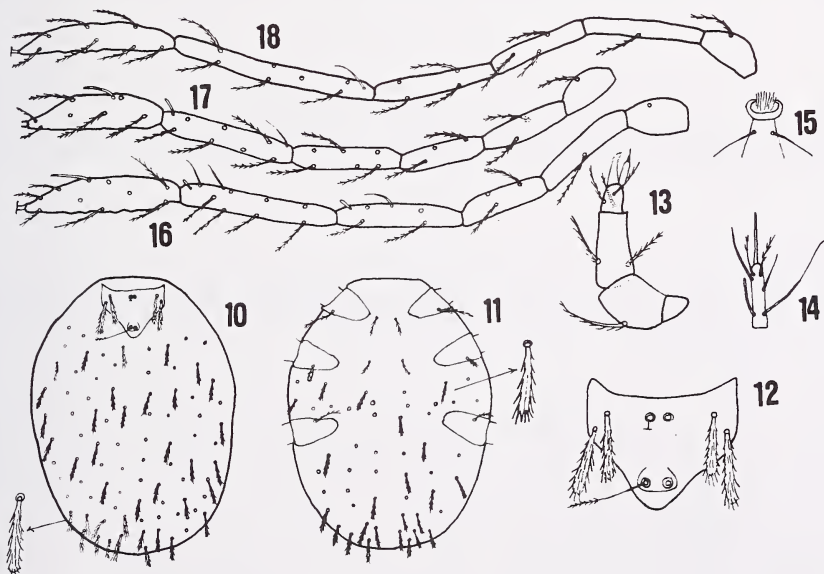
Metric data are given in Table 1.

Type material: Holotype larva: Dzambul (Aulia Ata), Kazakhstan, from undetermined Tenebrionidae (Coleoptera); one paratype, data the same as in holotype (MNHWU).

Remarks: *L. auliacus* n. sp. is similar to *L. guus* known from Turkmenia (Haitlinger 1990b), *L. josifovi* Beron known from Bulgaria (Beron 1975), *L. sudanensis* (Oud.) known from Sudan (Oudemans 1912), *L. mogadoranus* and *L. akkus* Haitlinger known from Morocco and Spain, *L. horiacus* from Syria and *L. tammuzi* from Syria, Israel and Saudi Arabia (Haitlinger 1990b, 1994). From *L. guus* it can be separated by ratio L/W (0.82–0.86 to 0.66–0.70), AW/ISD (2.11–2.23 to 2.32–2.64), shorter GL (230–234 to 244–288), Ta III (158–164 to 190) and Ti III (212–234 to 324); from *L. josifovi* it differs especially by shape of scutum, longer AW (116–118 to 85), PW (126–128 to 97), AW/ISD (2.11–2.23 to 1.54) and Ti III/AW (1.80–2.01 to 2.40); from *L. sudanensis* by L/W and distinctly longer legs I–III; from *L. mogadoranus* by AW/ISD (2.11–2.23 to 2.42–2.68), longer Ti III (212–234 to 156) and Ti III/AW (1.80–2.01 to 1.32); from *L. akkus* it can be distinguished basing on shorter Ta III (158–164 to 206), Ti III/AW (1.80–2.01 to 3.55); from *L. horiacus* and *L. tammuzi* it differs in longer AW (116–128 to 72–80 and 92–100, respectively), Ti III (212–234 to 184 and 170–204), Pgl (length of palpgenu) (72–74 to 54–62 and 64–68).

### *Leptus batoricus*, new species

Diagnosis: Two palpgenualae, ~18 intercoxalae, AL < PL, AL, PL < 60, Ta I and Ti I < 130, GL < 180, AW/ISD < 1.80, AW < 90, PW < 115.



Figs 10–18: *Leptus batoricus* n. sp.; 10 — idiosoma, dorsal view; 11 — idiosoma, ventral view; 12 — scutum; 13 — palp, dorsal view; 14 — palptarsus; 15 — hypostomalae; 16 — leg I, tarsus-trochanter; 17 — leg II, tarsus-trochanter; 18 — leg III, tarsus-trochanter.

Table 1: Metric data for *Leptus auliacus* n. sp. — 1; *L. batoricus* n. sp. — 2; *L. hammameticus* n. sp. — 3; *L. alkmenae* n. sp. — 4; *L. admeti* n. sp. — 5; H — holotype, P — paratype.

	1 H	1 P	2 H	3 H	3 P	4 H	5 H
Length of idiosoma	864	456	368	520	752—1416	576	408
Width of idiosoma	520	280	272	376	416—1008	400	296
L	~108	~116	~80	122	96—124	~130	110
W	132	134	~104	122	120—144	122	146
AW	116	118	82	100	100—106	92	106
PW	128	126	90	112	112—120	104	130
SBa	18	16	12	16	14—16	14	14
SBp	18	16	12	16	14—16	14	14
AL	58	56	46	82	76—80	70	72
PL	46	50	50	62	60—66	—	84
AP	20	20	12	10	—	18	22
ISD	52	56	50	44	40—44	78	72
ASE	~50	—	—	—	—	—	—
PSE	84	—	56	—	—	—	—
DS	32—42	36—40	24—34	40—46	34—50	56—72	52—62
GL	230	234	160	300	278—280	206	264
Pgl	74	72	50	86	84—86	76	72
PaScFed	~60	~62	54	94	84—92	68	~80
PaScGed	60	64	50	78	76—84	62	68
PaScGev	52	54	38	76	60—78	—	—
Coxalae I	60	70	56	84	70—80	90	92
Coxalae II	32	30	—	36	30—80	32	36
Coxalae III	38	—	26	34	30—40	52	52
pHy	~64	~64	32	50	44	?36	60
St I	50	50	34	54	52	42	48
St II	40	—	32	48	48—50	—	44
Ta I	154	164	110	180	184—190	160	184
Ti I	184	174	114	260	254—290	210	254
Ge I	134	136	94	180	184—192	148	172

Table 1 (continued)

	1	1	2	3	3	4	5
	H	P	H	H	P	H	H
Tf I	96	102	62	130	134-150	114	124
Bf I	108	102	72	148	140-152	106	130
Tr I	46	52	46	60	60	60	54
Cx I	~66	~76	~54	74	76-84	~70	72
Ta II	130	126	92	152	146-154	144	162
Ti II	156	142	100	210	210-232	200	232
Ge II	116	114	80	142	140-148	132	152
Tf II	84	82	62	110	108-114	106	120
Bf II	90	88	70	112	124-134	100	116
Tr II	52	50	44	60	50-54	64	56
Cx II	~84	~82	60	86	82-90	82	~64
Ta III	164	158	116	184	184-192	—	172
Ti III	234	212	150	312	300-336	—	310
Ge III	138	126	90	164	166-180	148	166
Tf III	110	106	76	140	148-154	126	146
Bf III	112	106	80	142	144-156	126	144
Tr III	50	54	42	62	56-58	64	60
Cx III	~80	~82	58	82	76-90	~84	92
Ti I / Ge I	1.37	1.28	1.21	1.44	1.38-1.51	1.42	1.48
Ti II / Ge II	1.34	1.24	1.25	1.48	1.50-1.57	1.51	1.53
Ti III / Ge III	1.69	1.68	1.67	1.90	1.81-1.87	—	1.87
AW / ISD	2.23	2.11	1.64	2.27	2.41-2.50	1.18	1.47
AW / AP	5.80	5.90	6.83	10.00	10.00-10.60	5.11	4.82
Ti I / AW	1.59	1.47	1.39	2.60	2.40-2.90	2.28	2.40
Ti III / AW	2.02	1.80	1.45	3.12	2.83-3.36	—	2.92
AW / AL	2.00	2.11	1.78	1.22	1.31-1.32	1.31	1.47
L / W	0.82	0.86	0.77	1.00	0.80-0.86	1.06	0.75
PW / AW	1.10	1.07	1.10	1.12	1.12-1.13	1.13	1.23
Ti III / Zi I	1.27	1.22	1.31	1.20	1.16-1.18	—	1.22
ISD / AP	2.60	2.80	4.17	4.40	4.00-4.40	4.33	3.27
Ti II / PW	1.22	1.13	1.11	1.87	1.75-2.05	1.92	1.78

**Description:** Dorsal scutum with anterior margin slightly concave, posterolateral margins concave. AL < PL. ASE damaged, PSE with setules on distal part. Distinctly cuticular lines bounding bases of PSE and extending behind these bases (Fig. 12). Bases of AL far from anterior angle of scutum. Number of dorsal setae (barely visible) about 86; these setae slightly enlarged, barbed (Fig. 10).

Ventral surface of idiosoma with two pairs of sternalae I–II. Between coxae II–III about 18 setae. Beyond coxae III (badly visible) about 32 setae as in Fig. 11. Coxalae I distinctly longer than the remaining ones.

Leg lengths: I–552, II–508, III–612. Specialised setae as follows: SoTaI 56d (22), SoTi I 61d (22), SoTi I 81d (22), VsTi I 89d (6), SoGe I 57d (26), SoTa II 46d (22), SoTi II 4d (22), SoTi II 82d (12), SoTi III 4d (20) (Figs 16–18).

Gnathosoma rather short, pHy nude. Palp with short palpgenu, palpfemorala and dorsal palpgenuala barbed; ventral palpgenuala branched, shorter than dorsal. Palptibia with three barbed setae (Fig. 13). Palptarsus has 7 setae; of them two setae barbed (Fig. 14).

Metric data are given in Table 1.

**Type material:** Holotype larva: Mongolia, unknown locality, from *Pimelia cephalotes* Pall. (Tenebrionidae); MNHWU.

**Remarks:** *L. batoricus* n. sp. is most similar to *L. horiacus*. It can be separated by longer ISD (50 to 38–40), shorter Ti I (114 to 142), Ti III (150 to 184), ratio AW/ISD (1.64 to 1.85–1.89), GL/Pgl (3.20 to 2.71–2.93), Ti I/AW (1.39 to 1.92). Moreover, it differs from *L. tammuzi*, *L. hammameticus* n. sp., *L. mirenae* Haitlinger, *L. mogadoranus* by distinctly shorter Ti III.

### *Leptus hammameticus*, new species

**Diagnosis:** Two palpgenuala, ~16 intercoxalae, AL > PL, AL 70–90, PL 55–70, Ta III > 290, GL > 270, AW/ISD > 2.20, AW < 120, PW < 130.

**Description:** Scutum with anterior border deeply concave, posterolateral borders distinctly concave. Posterior border slightly concave. Whole area of scutum papillose. AL > PL; sensillae with setules on distal part. Bases of sensillae bounded by cuticular lines. Bases of AL far from anterior angle of scutum; bases of ASE placed on the same level as bases of AL (Fig. 21). In two paratypes both scutala AL are dual and bear the same base (Fig. 29). Dorsal setae numerous, about 190 in holotype; these setae barbed with acute setules (Fig. 19).

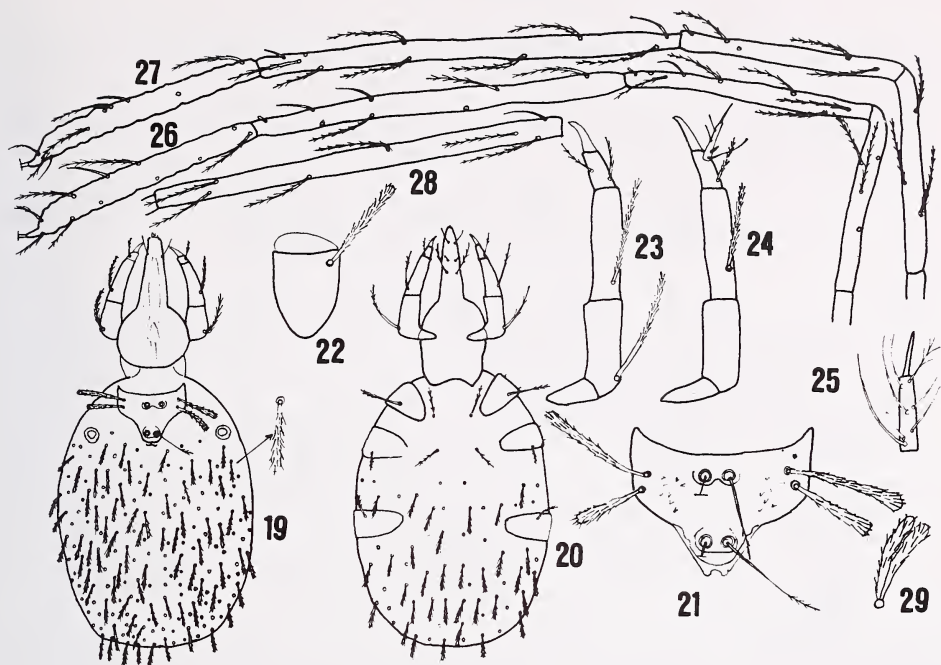
Ventral surface of idiosoma with two pairs of sternalae I, II almost equal in length. Between coxae II–III about 44 barbed setae. Coxalae I distinctly longer than the other ones; in holotype more than twice longer than coxalae II–III (Fig. 20).

Leg lengths: I–1032 (H) in holotype, 1040, 1110 in paratypes (P), II–872 (H), 868, 918 (P), III–1089 (H), 1090, 1150 (P). Leg with specialised setae as follows: SoTa I 63d (32), SoTi I 67d (32), SoTi I 83d (22), VsTi I 91d (8), SoGe I 62d (28), VsGe I 90d (8), SoTa II 76d (26), SoTi II 4d (32), SoTi II 90d (12), VsGe II 87d (8), SoTi III 5d (40) (Figs 26–28).

Gnathosoma very long, bears barbed hypostomalae (pHy). Palp with relatively long palpgenu (Pgl); palpfemorala barbed, longer than dorsal and ventral palpgenuala. Palptibia has three barbed setae (Figs 23–24). Palptarsus with 8 setae; of them only one seta branched (Fig. 25).

**Type material:** Holotype larva: Bir Boa n. Hammamet, North Tunisia, 14 September 1994, from undetermined Tenebrionidae; leg. R. Haitlinger; MNHWU. Paratypes: 1 l, 14 September 1994, Bir Boa n. Hammamet; 4 l, El Margaza n. Hammamet, 13 September 1994; 3 l, Tamerza (Sahara), 17 September 1994; all from undetermined Tenebrionidae; leg. R. Haitlinger. All paratypes in author's collection. Three specimens were placed on femur and two specimens on tibia of posterior legs of hosts.

**Remarks:** *L. hammameticus* is similar to the group species living in Mediterranean Region and bearing more than four intercoxalae such as: *L. akkus*, *L. mirenae* both from Spain, *L. mogadoranus* from Morocco, *L. dubius* Paoli from Italy, *L. horiacus* from Syria, *L. tammuzi* from Syria, Israel and Saudi Arabia and *L. pyrenaicus* Andre from Pyrenees. It is similar



Figs 19–29: *Leptus hammameticus* n. sp.; 19 — idiosoma, dorsal view; 20 — idiosoma, ventral view; 21 — scutum; 22 — coxa I; 23 — palp, dorsal view; 24 — palp, ventral view; 25 — palptarsus; 26 — leg I, tarsus-telofemur; 27 — leg II, tarsus-telofemur; 28 — leg III, tibia; 29 — AL, anomaly (paratype).

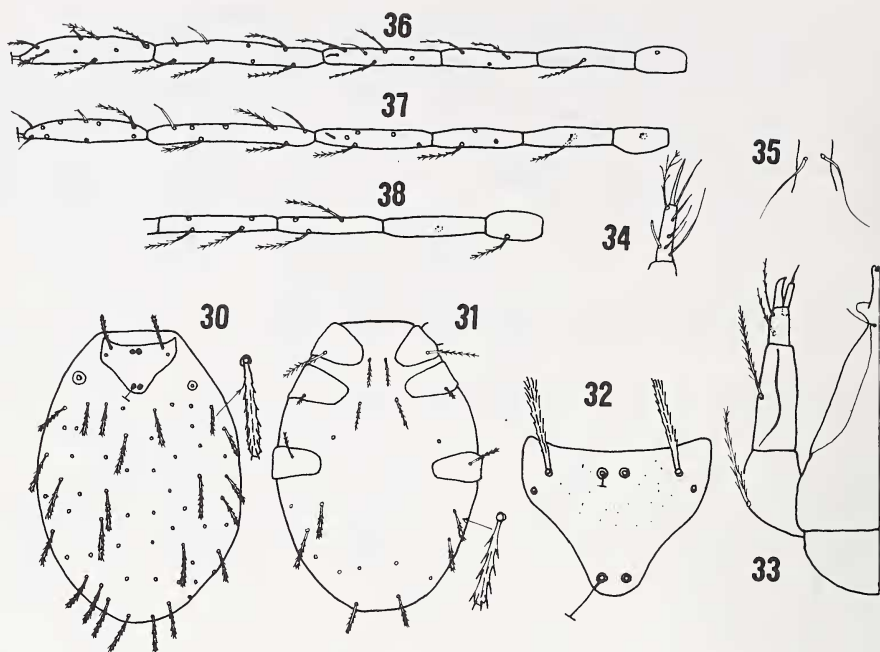
also to *L. josifovi* from Bulgaria (Paoli 1937, Andre 1953, Beron 1975, Haitlinger 1990a, 1994a, b). It is most similar to *L. akkus* but can be distinguished by longer AL (76–82 to 66–72), ratio AL/PL (1.21–1.32 to 1.03), AW/ISD (2.27–2.50 to 2.04–2.11), GL/Pgl (3.23–3.49 to 2.71–2.78) and shorter Ti III (300–336 to 362) and first of all by number of dorsal setae ((~190 to ~102). From *L. mogadoranus*, *L. horiacus*, *L. tammuzi* and *L. mirenae* it differs by number of dorsal setae; in all these species number of dorsal setae is below 140. From all these species it differs also by longer AL (>74 to <74).

#### *Leptus alkmenae*, new species

**Diagnosis:** One palpgenuala, AL > 60, anterior sockets in the same level as bases of AL. Ta I > 140 nm, Ti I > 190 nm long. Scutum longer than wide, AW/ISD > 1.05.

**Description:** Dorsal scutum without special markings. Anterior margin and posterolateral margins slightly concave. Anterior sensilla sockets are on the same level as AL scutula bases. Scutalae (AL) strong, blunted with distinct setules. PL and sensillae damaged (Fig. 32). Diameter of eye lens very small — 10  $\mu$ m. Dorsum with ~60 setae, blunted terminally with acute setules (Fig. 30).

Ventral surface of idiosoma with sternalae I and II bearing setules, subequal in length. Intercoxalae 4 (barely visible — in this place is a dark spot). Beyond coxae III probably about 20 setae (invisible in central part of idiosoma — covered by a dark spot) (Fig. 31).



Figs 30—38: *Leptus alkmenae* n. sp.; 30 — idiosoma, dorsal view; 31 — idiosoma, ventral view (central part invisible — is covered by dark spot); 32 — scutum; 33 — fragment of gnathosoma, dorsal view; 34 — palptarsus; 35 — hypostomalae; 36 — leg I, tarsus-trochanter; 37 — leg II, tarsus-trochanter; 38 — leg III, genu-trochanter.

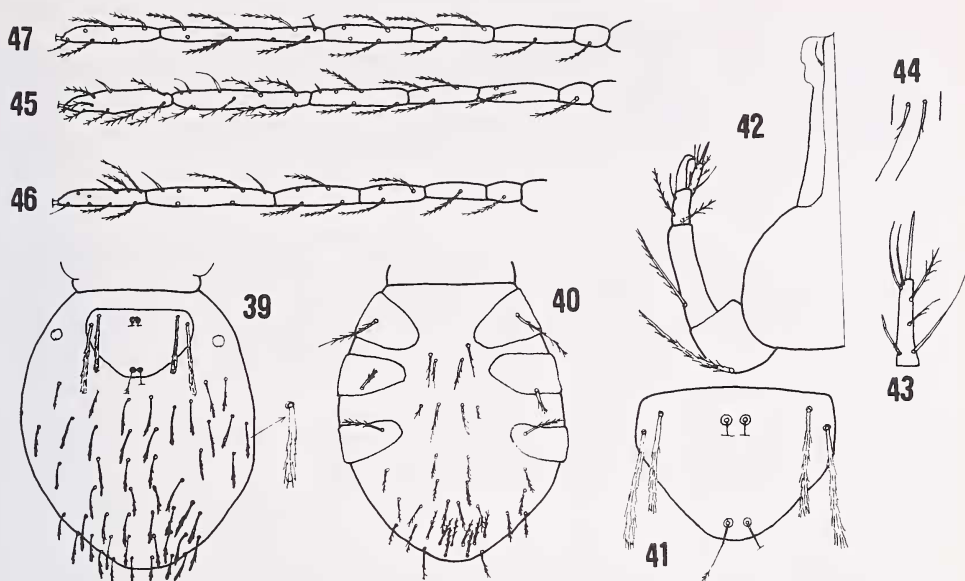
Leg lengths: I—868, II—828, III—damaged. Leg specialised setae as follows: SoTa I (damaged) 68d, SoTi I 69d (24), VsTi I 88d (8), SoGe I 67d, VsGe I 88d (8), SoTa II 68d (—), SoTi II 8d (14), SoTi II 88d (22), VsGe II 91d (6) (Figs 36—38). Coxalae I over twice longer than coxalae II and distinctly longer than coxalae III (Fig. 31). Gnathosoma rather long, bears short and nude hypostomalae (Fig. 35). Palpfemur with one barbed seta, palpgenu rather long, bears crista and barbed seta almost equal in length with palpfemorala; palptibia with two barbed setae and one damaged seta (Fig. 33). Palptarsus with 7 setae; among them two barbed (Fig. 34).

Metric data are given in Table 1.

Type material: Holotype larva: Uttar Pradesh, India, May 1981, from *Cassida syratica* Boh. (Coleoptera: Chrysomelidae); MNHWU.

Remarks: *Leptus alkmenae* n. sp. belongs to the species group with one palpgenuala and with no more than four intercoxalae. Among them it is especially similar to *L. hidakai* Kaw., *L. japonicus* Kaw. from Japan, *L. alvimordax* South., *L. alopecurus* South. from Australia, *L. tetradius* from Sri Lanka, *L. aldona*e Haitlinger from Madagascar and *L. cavernicola* Fain & Elsen from Rwanda. It can be separated from Japanese species by posterior margin of scutum without concave, from *L. hidakai* by the lack of thin anterior margin of scutum and from *L. japonicus* by nude hypostomalae; from both Australian species and *L. tetradius* it differs by longer ISD and ratio AW/ISD (below 1.30); from two African species it can be distinguished basing on longer AW, PW, ISD, AL, Ta I—III and Ti I—III.





Figs 39–47: *Leptus admeti* n. sp.; 39 — idiosoma, dorsal view; 40 — idiosoma, ventral view; 41 — scutum; 42 — fragment of gnathosoma, dorsal view; 43 — palptarsus; 44 — hypostomae; 45 — leg I, tarsus-trochanter; 46 — leg II, tarsus-trochanter; 47 — leg III, tarsus-trochanter.

### *Leptus admeti*, new species

**Diagnosis:** One palpgenuala, four intercoxalae, AL > 60, PL > 70, Ta I > 160, Ti I > 220, scutum wider than long, GL > 240, AW/ISD > 1.30.

**Description:** Dorsal scutum wider than long with straight anterior margin and convex posterolateral margins. Anterior serrillae near level of bases of AL. Scutalae long, with acute outstanding setules (Fig. 41).

Diameter of eye lens 20. Dorsal setae ~ 50 in number; proximal part of setae without setules (Fig. 39).

Ventral surface of idiosoma with sternalae I–II subequal in length bearing moderately outstanding setules. Four intercoxalae present, laterals — 24  $\mu$ m over twice shorter than medials — 58 nm (Fig. 40). Behind coxae III about 26 setae.

Leg lengths: I—990, II—902; III—1090. Specialised setae as follows: SoTa I 63d (38), SoTi I 68d (54), SoTi I 86d (34), VsTi I 94d (8), VsGe I 94d (8), SoTa II 51d (22), SoTi II 4d (44), SoTi II 86d, SoTi III 3d (Figs 45–47). Coxalae I distinctly longer than coxalae III and over twice longer than coxalae II.

Gnathosoma long, with long and slightly barbed hypostomae (Fig. 44). Palpfemorala longer than genuala; two palptibialae barbed, third seta nude (Fig. 42). Palptarsus with 7 setae: among them two barbed (Fig. 43).

Metric data as in Table 1.

**Type material:** Holotype larva: Soekaranda, Sumatra, Indonesia, from *Airathus ferialis* S. (Homoptera: Fulgoridae); MNHWU.

Remarks: *L. admeti* n. sp. is similar to *L. gagrellae*, *L. calidus*, *L. cerambycis* South. and *L. managarus*. It can be distinguished from these species basing on ratio L/W (0.75 to 1.36 in *L. gagrellae*, 1.03 in *L. calidus*, 0.91 in *L. cerambycis* and 0.93 in *L. managarus*); moreover it differs from *L. calidus* in shorter Ti I (254 to 386) and Ta I (184 to 224); from *L. managarus* in longer AW (106 to 88), PW (130 to 102), GL (264 to 170), Ta I (184 to 150) and W (146 to 112); from *L. cerambycis* in longer AW (106 to 80), Ta I (184 to 155) and Ti I (254 to 178).

### *Leptus meloidarum* Beron, 1975

Species known only from Bulgaria (Beron 1975). It was obtained from undetermined Meloidae (Coleoptera). I have the following specimens: one specimen from Kirghizstan obtained from *Cicindela granulata* Gebl. (Coleoptera: Cicindellidae); to date on Cicindellidae only two species of *Leptus* were found: *L. olafi* Haitlinger from Colombia and *L. bogghoranus* Haitlinger from New Guinea (Haitlinger 1990b, 1991a). Moreover, many (36) specimens were obtained by me in Italy (Fiuggi) on 16 September 1992; they were obtained from various Tenebrionidae (Coleoptera), Orthoptera and Opiliones. Beron and later Southcott (1992) gave measurements mainly for the holotype. In Table 2 measurements for specimens from Kirghizstan and Italy are given. Based on known specimens the admission of *L. meloidarum* as a species with a slight specificity to arthropods is possible.

Table 2: Metric data for *Leptus meloidarum* Beron from Kirghizstan (K) and Italy (I).

	K	I		K	I
Length of idiosoma	400	528–1040	Bf I	—	84–96
Width of idiosoma	264	352–760	Tr I	46	50–58
L	~112	108–122	Cx I	—	74–86
W	138	126–148	Ta II	102	104–120
AW	104	100–110	Ti II	124	122–134
PW	130	114–130	Ge II	96	90–100
SBa	14	12–14	Tf II	68	64–74
SBp	16	14–18	Bf II	68	70–84
AL	—	66–70	Tr II	46	50–58
PL	72	64–74	Cx II	~80	82–90
AP	20	16–24	Ta III	—	116–134
ISD	68	64–72	Ti III	—	174–192
DS	38–50	36–60	Ge III	—	100–114
GL	230	216–248	Tf III	—	80–90
Pgl	80	70–80	Bf III	—	88–100
PaSc Fed	80	70–80	Tr III	—	50–60
Pa Sc Ged	62	60–68	Cx III	—	76–84
Coxala I	70	70–80	AW / ISD	1.53	1.47–1.56
Coxala II	—	28–32	Til III / AW	—	1.64–1.86
Coxala III	—	44–50	AW / AP	5.20	4.33–6.66
pHy	—	44–50	Ti III / Ti I	—	1.19–1.27
St I	40	38–44	Ti III / Ti I	—	1.19–1.27
St II	36	40–44	Ti I / AW	—	1.36–1.52
Ta I	—	122–134	AL / PL	1.25	0.89–1.06
Ti I	—	146–158	PW / AW	—	1.14–1.23
Ge I	—	104–116	AW / AL	—	1.43–1.61
Tf I	—	72–80	L / W	—	0.73–1.08

*Leptus mariae* Haitlinger, 1987

Species known hitherto from Poland, Holland and Slovenia (Haitlinger 1987, 1991b, 1992, Southcott 1992). Two further specimens were collected in Italy: 1 ♀, 12 September 1992 in San Godenzo n. Florence and 1 ♀, 13 September 1992 in Anacapri (Capri); both from undetermined Tenebrionidae; leg. R. Haitlinger. Beetles belonging to Tenebrionidae are new hosts for *L. mariae*. In Poland and other countries larvae of this species were obtained from May to July. Larvae from Italy obtained in September and recently in Poland in August (own information) showed that this species has a long time of reproduction.

*Leptus anomalus* Southcott, 1946

This species was found in South Australia but its host is unknown hitherto (Southcott 1991). One specimen was collected 12 October 1972, 21 S.W. of Barrow Creek, Australia, from *Colibe bicarinatus* (Ch.) (Tenebrionidae, Coleoptera). It is a new host for *L. anomalus*.

## Remarks

Haitlinger (1994a) found that *Leptus* larvae having more than four intercoxalae are mainly associated with Tenebrionidae. This feature is well distinguishing this species group from other *Leptus*. Among 16 then known species 10 are associated with this family. Recently, including the new species described herein, six further species bearing more than four intercoxalae were found; four of them are associated with Tenebrionidae. Therefore, among 20 species with this feature, 13 species are associated with Tenebrionidae: *L. akkus*, Spain, *L. mogadoranus*, Morocco, *L. bertoldi* Haitlinger, Ghana, *L. pasopaicus* Haitlinger, Namibia, *L. ogazulacus* Haitlinger, Malawi, *L. hammameticus* n. sp., Tunisia, *L. sudanensis*, Sudan, *L. guus*, Turkmenia, *L. horiacus*, Syria, *L. tammuzi*, Syria, Israel, Saudi Arabia, *L. batoricus* n. sp., Mongolia, *L. auliacus* n. sp., Kazakhstan, *L. ursyni* Haitlinger, Chile.

The host associations of the remaining seven species are probably as follows: *L. comosus* South./Muscidae, Australia; *L. mirenae*/Buprestidae, Spain; *L. pyrenaicus*/Scorpionidae, Pyrenees; *L. josifovi*/Heteroptera, Bulgaria; *L. slivovi* Beron/Lepidoptera, Europe; *L. charanyca* Fain/Lepidoptera, Belgium; *L. dubius*/Orthoptera, Diptera, Italy. Except for *L. dubius* which probably has no specific host, *L. slivovi* and *L. charanyca* are associated with Lepidoptera. For the remaining species the host associations are unknown.

*Leptus* species associated with Tenebrionidae occur in dry areas, including desert areas (like *L. hammameticus* in the Sahara). They are cosmopolitan and found worldwide but not in the Nearctic Region.

Below a key is given for the species group of *Leptus* having more than four intercoxalae.

1. One palpgenuala present ..... 2.
- Two palpgenuala present ..... 4.
2. AW > 120, PW > 130, Ti I > 150 ..... *L. ursyni* Haitlinger, Chile
- AW < 100, PW < 120, Ti I < 150 or > 180 ..... 3.
3. Ta III < 120, Ti III < 180 ..... *L. charanyca* Fain, Belgium
- Ta III > 130, Ti III > 200 ..... *L. slivovi* Beron, Bulgaria
4. AL and PL < 30 ..... *L. pyrenaicus* Andre, Pyrenees
- AL and PL > 30 ..... 5.

5. Solenidia on Tf I—III present ..... *L. comosus* Southcott, Australia  
 —. Solenidia on Tf I—III absent ..... 6.
6. Ta III < 100, Ti III < 130 ..... *L. heleus* Southcott, Australia  
 —. Ta III > 100, Ti III > 130 ..... 7.
7. Ti III > 300 ..... 8.  
 —. Ti III < 300 ..... 11.
8. AW < 95, PW < 105 ..... *L. bertoldi* Haitlinger, Ghana  
 —. AW > 98, PW > 110 ..... 9.
9. Ti II/AW < 1.80, AW > 130 ..... *L. guus* Haitlinger, Turkmenia  
 —. Ti II/AW > 1.90, AW < 126 ..... 10.
10. Ti III > 340, AW/ISD < 2.15, Gl/Pgl < 3.10 ..... *L. akkus* Haitlinger, Spain  
 —. Ti III < 340, AW/ISD > 2.20, Gl/Pgl > 3.15 ..... *L. hammameticus* n. sp., Tunisia
11. Dorsum bears over 140 setae ..... 12.  
 —. Dorsum bears below 140 setae ..... 13.
12. W (width of scutum) > 105, leg II length (without coxa) < 520 .....  
 ..... *L. sudanensis* (Oudemans), Sudan  
 —. W < 105, leg II length > 520 ..... *L. ogazulacus* Haitlinger, Mozambique
13. PW > 115 ..... 14.  
 —. PW < 115 ..... 15.
14. Ti III > 210, Ta III > 145, AW/ISD < 2.35 ..... *L. auliacus* n. sp., Kazakhstan  
 —. Ti III < 180, Ta III < 140, AW/ISD > 2.35 ..... *L. mogadoranus* Haitlinger, Morocco
15. Ti III > 230 ..... *L. mirenæ* Haitlinger, Spain  
 —. Ti III < 220 ..... 16.
16. DS number > 115 ..... *L. josifovi* Beron, Bulgaria  
 —. DS number < 115 ..... 17.
17. AL/ISD > 1.20 ..... *L. pasopaicus* Haitlinger, Namibia  
 —. AL/ISD < 1.20 ..... 18.
18. Ti III/AL > 3.80, Ta III/PW > 1.50 ..... 19.  
 —. Ti III/AL < 3.80, Ta III/PW < 1.50 ..... 20.
19. W/ISD < 2.15, AL/ISD < 1.00 ..... *L. dubius* Paoli, Italy  
 —. W/ISD > 2.20, AL/ISD > 1.00 ..... *L. horiacus* Haitlinger, Syria
20. GL < 190, Pgl < 60, Ti I/AW < 1.50 ..... *L. batoricus* n. sp. Mongolia  
 —. GL > 200, Pgl > 60, Ti I/AW > 1.50 .. *L. tammuzi* Haitlinger, Syria, Israel, Saudi Arabia.

#### Acknowledgment

I would like to express my sincere thanks to Dr. M. Kak (Museum of Natural History, Wrocław University) for the loan of specimens.

#### Zusammenfassung

Es werden fünf neue Arten der Milbengattung *Leptus* beschrieben: *L. auliacus* von undeterminierten Tenebrionidae (Coleoptera) aus Kasachstan, *L. admeti* von *Airathous ferialis* (Homoptera, Fulgoridae) aus Sumatra, *L. alkmenæ* von *Cassida syratica* (Coleoptera: Chrysomelidae) aus Indien, *L. batoricus* von *Pimelia cephalotes* (Tenebrionidae) aus der Mongolei und *L. hammameticus* von undeterminierten Tenebrionidae aus Tunesien. Neue Wirte und Fundorte werden für *L. meloidarum*, *L. mariaæ* und *L. anomalus* mitgeteilt. Die Arbeit enthält ebenfalls einen Schlüssel zu den Larven der Artengruppe mit mehr als vier Intercoxalae.

## References

- André, M. (1953): Une espece nouvelle de *Leptus* (acarien) parasite de scorpions. — Bull. Mus. Hist. Nat. Paris 2: 150–154.
- Beron, P. (1975): Erythraeidae (Acariformes) larvaires de Bulgarie. — Acta zool. bulg. 1: 45–75.
- Haitlinger, R. (1987a): The genus *Leptus* Latreille, 1796 and *Charletonia* Oudemans, 1910 (Acari, Prostigmata, Erythraeidae) in Poland (larvae). — Pol. Pismo ent. 57: 339–349.
- Haitlinger, R. (1987b): Larval Erythraeidae (Acari, Prostigmata) from Madagascar. — Pol. Pismo ent. 57: 701–723.
- Haitlinger, R. (1990a): The new species of *Leptus* Latreille, 1796 (Acari, Prostigmata, Erythraeidae) from Tenebrionidae (Coleoptera) with a key to European and North African species. — Pol. Pismo ent. 60: 45–58.
- Haitlinger, R. (1990b): Four new species of *Leptus* Latreille, 1796 (Acari, Prostigmata, Erythraeidae) from insects of Australia, New Guinea and Asia. — Wiad. parazyt. 36: 47–53.
- Haitlinger, R. (1990c): Four new species of *Leptus* (Acari, Prostigmata, Erythraeidae) from tropical Africa. — Angew. Parasitol. 31: 29–33.
- Haitlinger, R. (1991a): Six new species of *Leptus* Latreille, 1796 (Acari, Prostigmata, Erythraeidae) from Neotropical Region. — Zesz. Nauk. Akad. Roln. we Wroclawiu, Zootchnika 35: 265–272.
- Haitlinger, R. (1991b [1992]): New data on distribution on larvae from the genus *Leptus* Latreille, 1796 (Acari, Prostigmata, Erythraeidae) in Poland with the description of *Leptus miromiri* n. sp. — Wiad. parazyt. 37: 499–506.
- Haitlinger, R. (1993): Larval *Leptus* ectoparasitic on tenebrionid beetles from Ghana. — Boll. Soc. ent. ital. 125: 166–170.
- Haitlinger, R. (1994a): Two new species of *Leptus* Latreille, 1796 (Acari: Prostigmata: Erythraeidae) associated with Tenebrionidae (Insecta: Coleoptera). — Israel J. Ent. 28: 139–149.
- Haitlinger, R. (1994b): A larval mite (Acari, Erythraeidae) parasitizing the buprestid beetle (Insecta, Coleoptera) in Spain. — Graellsia 50: 165–166.
- Ishii, I. (1933): A new species of *Leptus* from Kyushu (Acarina: Erythraeidae). — Igaku Kenkyu (Acta Medica) 23: 160–163.
- Kato, Y. & K. Kitahara (1958): A new species of Erythraeidae infesting horse-fly from Kuroshima. — Jap. J. Sanit. Zool. 9: 171–174.
- Kawashima, K. (1958): Studies on larval erythraeid mites parasitic on arthropods from Japan (Acarina: Erythraeidae). — Kyushu J. Med. Sci. 9: 190–211.
- Oudemans, A. C. (1912): Die bis jetzt bekannten Larven von Thrombidiidae und Erythraeidae mit besonderer Berücksichtigung der für den Menschen schädlichen Arten. — Zool. Jahrb. Abt. I. Suppl. 14: 1–230.
- Paoli, G. (1937): Studi sulle cavalette di Foggia (*Doclostaurus maroccanus* Thunb.) e sui loro oofagi (Ditteri Bombiliini e Coleotteri Meloide) ed Acari ectofagi (Eritreidi e Trombidiidi). — Redia 23: 27–206.
- Shiba, M. (1976): Taxonomic investigation on free-living Prostigmata from the Malay Peninsula. — Nat. life southeast Asia 7: 83–229.
- Southcott, R. V. (1988): Two new larval ectoparasitic mites (Acarina: Erythraeidae) from Sri Lankan tetrigid grasshoppers. — Entom. Scand., suppl. 30: 151–159.
- Southcott, R. V. (1991): Descriptions of larval *Leptus* (Acarina: Erythraeidae) ectoparasitic on Australian Diptera, and two earlier described Australian larvae. — Invert. Taxon. 5: 717–763.
- Southcott, R. V. (1992): Revision of the larvae of *Leptus* Latreille (Acarina: Erythraeidae) of postlarval instars. — Zool. J. Linn. Soc. 105: 1–153.
- Southcott, R. V. (1994): Two new larval Erythraeidae (Acarina) from Thailand, with keys to the larvae of *Leptus* for Asia and New Guinea, and world larvae of *Hauptmannia*. — Steenstrupia 20: 165–176.

Vitzthum, H. (1926): Malayische Acari. — *Treubia* 8: 1–198.

Prof. Dr. habil. Ryszard Haitlinger, Department of Zoology, Academy of Agriculture, ul. Cybulskiego 20, 50-205 Wrocław, Poland.